Core Content for Mathematics Assessment

Draft for Assessment Contractors

Version 4.0

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Kentucky Department of Education

Introduction
Core Content for Mathematics Assessment

What is the *Core Content for Mathematics Assessment*?

The *Core Content for Mathematics Assessment*, Version 4.0, represents the content essential for all students to know and the content that is fair game for inclusion on the state assessment. It represents the mathematics content from Kentucky's Academic Expectations and *Program of Studies* and captures the "big ideas" of mathematics. Version 4.0 *Core Content for Mathematics Assessment* and the Academic Expectations provide the parameters for test developers as they design the state assessment items. These content standards and expectations provide focus for the development of the Kentucky Core Content Test (KCCT) beginning in 2007.

The *Core Content for Mathematics Assessment* is not intended to represent the comprehensive local curriculum for mathematics assessment and instruction. It is also not the comprehensive *Program of Studies for Mathematics*, which specifies the minimum content for the required credits for high school graduation, and the primary, intermediate and middle level programs leading to these requirements.

Kentucky Academic Expectations for Mathematics

The Kentucky Academic Expectations define what students should know and be able to do upon graduation from high school. These large goals were used as a basis for developing the Program of Studies and the Core Content for Assessment documents.

Goal 1: Students are able to use basic communication and mathematics skills for purposes and situations they will encounter throughout their lives.

- 1.5 to 1.9 Students use mathematical ideas and procedures to communicate, reason, and solve problems.
- 1.16 Students use computers and other types of technology to collect, organize, and communicate information and ideas.

Goal 2: Students shall develop their abilities to apply core concepts and principles from mathematics, the sciences, the arts, the humanities, social studies, practical living studies, and vocational studies to what they will encounter throughout their lives.

- 2.7 Students understand number concepts and use numbers appropriately and accurately.
- 2.8 Students understand various mathematical procedures and use them appropriately and accurately.
- 2.9 Students understand space and dimensionality concepts and use them appropriately and accurately.
- 2.10 Students understand measurement concepts and use measurements appropriately and accurately.
- 2.11 Students understand mathematical change concepts and use them appropriately and accurately.

2.12 Students understand mathematical structure concepts including the properties and logic of various mathematical systems.
2.13 Students understand and appropriately use statistics and probability.

How is the *Core Content for the Mathematics Assessment* organized?

The *Mathematics Core Content for Assessment Version 4.0* is organized by grade level (end of primary (3rd), 4th, 5th, 6th, 7th, 8th, and high school) in order to ensure continuity and conceptual development. This is different from the current 3.0 Version that is organized in grade spans.

The *Mathematics Core Content for Assessment Version 4.0* is organized using the 2005 Mathematics Framework for Assessment for the National Assessment of Educational Progress (NAEP). The NAEP framework consists of five strands, with clusters within each strand. The *Mathematics Core Content for Assessment* is organized as follows:

(1) Number Properties and Operations
- (1.1) Number Sense
- (1.2) Estimation
- (1.3) Number Operations
- (1.4) Ratios and Proportional Reasoning
- (1.5) Properties of Numbers and Operations

(2) Measurement
- (2.1) Measuring Physical Attributes
- (2.2) Systems of Measurement

(3) Geometry
- (3.1) Shapes and Relationships
- (3.2) Transformations of Shapes
- (3.3) Coordinate Geometry

(4) Data Analysis and Probability
- (4.1) Data Representations
- (4.2) Characteristics of Data Sets
- (4.3) Experiments and Samples
- (4.4) Probability

(5) Algebraic Thinking
- (5.1) Patterns, Relations, and Functions
- (5.2) Variables, Expressions, and Operations
- (5.3) Equations and Inequalities

While the NAEP framework was used as the *Core Content for Assessment* organizer, the National Council of Teachers of Mathematics process standards of reasoning, communication, representation, connections, and problem solving are either embedded in the core content standards or are addressed more directly in the performance level descriptors. These process standards also constitute the strands within the Performance Level Descriptors for Mathematics. The Performance Level Descriptors denote the differences between novice, apprentice, proficient, and distinguished levels on the KCCT. The Performance Level Descriptors can be accessed at: http://www.education.ky.gov/NR/rdonlyres/en6buqjvte3hgf5ddhi6cggzpskobj3mxribbcgwayd4gtn3lztb2clkepwzekerbhopyxc4hwiez4epnbnn63njunh/SPLDMathematics.pdf

What do the codes for the *Core Content for Mathematics Assessment* mean?

The Mathematics Core Content for Assessment is addressed at each of the grade levels from end of primary through Grade 8, and then again for high school at Grade 11. The content standards for end of primary through Grade 8 were first developed in 2004 to address the No Child Left Behind testing which will begin in the spring of 2006. Each content statement within each grade level is identified by a grade level code and a numeric code that is consistent throughout the grade levels. The code begins with MA for mathematics. The grade level codes are:

Elementary	Middle School	High School
EP – end of primary	06 – sixth grade	11– eleventh grade
04 – fourth grade	07 – seventh grade	
05 – fifth grade	08 – eighth grade	

The numeric codes represent the strands, clusters, and number of the bullet for each bullet. For example, MA-04-3.2.1 would stand for the first bullet in the second cluster (Transformations of Shapes) of the third strand (Geometry) for fourth grade.

MA-04-3.2.1
- MA Mathematics
  - 04 Fourth Grade
    - 3 (third strand) Geometry
      - 2 (second cluster) Transformations of Shapes
        - 1 (first statement)

A new aspect of the refined Version 4.0 Mathematics Core Content for Assessment is Depth of Knowledge. Each of the state-assessed statements in the Core Content has a ceiling depth of knowledge level indicated. This means that an item on the state assessment could not be written higher than that level for that statement. An item could be written at a lower level. The levels for depth of knowledge are based on the research of Norman Webb from the University of Wisconsin-Madison. More information about the depth of knowledge levels can be found at: facstaff.wcer.wisc.edu/normw/All%20content%20areas%20%20DOK%20levels%2032802.doc

Core content statements are **bolded for "state assessment**" or *italicized* for "*supporting content but not for state assessment*". The intent is to show what core content statements are fair game to be assessed on the Kentucky Core Content Test (KCCT) and those that instructionally support the state assessed content, either at that grade level or as preparation for subsequent mathematics courses, but will not be assessed at the state level. Supporting content is critical to the student's deep understanding of the overall content and is to be used by schools to build a foundation of knowledge, skills, and processes that will enable students to be successful on the Kentucky Core Content Test. Supporting content statements are proposed for local instruction and assessment. The supporting content that is included in the document is italicized and not bolded and the code ends with a small letter, like MA-04-3.2.1a. The content statements for the state assessment have been clarified with verbs to represent what students will be expected to do and to reflect the depth of knowledge and cognitive complexity expected for the state assessment. They are not meant to limit the cognitive complexity for instruction in the classroom. In order for students to perform at a high level on the KCCT, they need to have mastered the supporting content as well as the state assessed content. The high school core content also contains statements that are in plain text. These items align Version 4.0 of the high school mathematics core content for assessment with the American Diploma Project benchmarks. These statements assist schools in understanding the mathematics that will be needed to prepare students for both postsecondary education and the workplace in the 21st Century.

Some Core Content standards contain additional information in parentheses. If there is a list inside with an e.g., preceding it, that means the examples included are meant to be just that, examples. However, if the list is not preceded by an e.g., the list is to be considered exhaustive and those items are the only items that are "fair game" for assessment.